

CLAIMS

1. A projection type video display characterized by comprising:

light deflecting means for circularly deflecting, in receiving irradiated light and transmitting or reflecting the received light, the light;

color separating means for separating the light into lights in the three primary colors and respectively introducing the lights into three hold type display elements;

projecting means for recombining image lights in the respective colors obtained through the hold type display elements and projecting the recombined image lights; and

element driving means for feeding a pixel-driving signal to each of the hold type display elements, and in that

the lights in the respective colors condensed in smaller areas than those of the element are circularly scrolled on the hold type display elements.

2. The projection type video display according to claim 1, characterized in that

the element driving means starts to feed pixel-driving signals for the succeeding frame to pixels which are located at a position, through which an

illuminating area passes, on each of the hold type display elements.

3. The projection type video display according to claim 2, characterized in that

the pixel-driving signal is fed at N times (N is an integer of 2 or more) of a frame rate, and the timing of illumination of a pixel is matched with the time when a response of the pixel is flattened out.

4. The projection type video display according to claim 3, characterized in that

a pixel-driving signal whose change is more greatly emphasized than a pixel-driving signal allowing a necessary response value of the pixel to be obtained is fed to the pixel, to compensate for delay.

5. The projection type video display according to claim 4, characterized by comprising

a table allowing data representing the pixel-driving signal whose change is emphasized by the final pixel value in the preceding frame and the current pixel value to be obtained.

6. The projection type video display according to any one of claims 1 to 5, characterized by comprising

control means for detecting a difference between a frame period and a deflection period by the light deflecting means and carrying out correction control of

the deflection period such that the difference is eliminated or occurs in a constant manner.

7. The projection type video display according to claim 6, characterized in that

such control that the luminance value of the pixel determined by a response of the pixel and a period of light irradiation onto the pixel in a case where the difference occurs is matched with a predetermined luminance value in a case where no difference occurs is carried out.

8. The projection type video display according to claim 7, characterized in that

a value whose change is more greatly emphasized than the target value of the response of the pixel is set depending on the difference, to feed the pixel-driving signal.

9. The projection type video display according to claim 7, characterized in that

the timing of feeding of the pixel-driving signal is controlled depending on the difference.

10. The projection type video display according to any one of claims 1 to 9, characterized by further comprising

a rod prism for introducing light emitted from a light source and condensed into the light deflecting means.

11. The projection type video display according to claim 10, characterized in that

the rod prism has a tapered shape so as to reduce the dispersion of the light.

12. The projection type video display according to any one of claims 1 to 11, characterized in that

the light deflecting means is constructed by rotatably providing a lens array wheel having a plurality of functional units each composed of a convex lens arranged in a disc shape along its circumference.

13. The projection type video display according to any one of claims 1 to 11, characterized in that

the light deflecting means is constructed by rotatably providing a prism.

14. The projection type video display according to any one of claims 1 to 11, characterized in that

the light deflecting means is constructed by rotatably providing a disc member having a light transmitter formed in a spiral shape and having a reflecting surface in an area other than the light transmitter.

15. The projection type video display according to any one of claims 1 to 11, characterized in that

the light deflecting means is constructed by rotatably providing a cylindrical member having light

transmitters and reflectors alternately formed repeatedly on its surface.

16. The projection type video display according to claim 10 or 11, characterized in that

the rod prism is folded such that the light entrance direction and the light exit direction differ,

the light deflecting means is composed of a rotatable cylindrical member having light transmitters and reflectors alternately formed repeatedly on its surface, and

the whole or a part of the rod prism is positioned inside the cylindrical member.

17. The projection type video display according to claim 14, characterized in that

the disc member is inclined to the direction of light irradiation,

an auxiliary mirror is provided at a position where light from the reflecting surface of the disc member is received, and

the light reflected from the auxiliary mirror is introduced into the light transmitter in the disc member.

18. The projection type video display according to claim 17, characterized in that

the disc member is composed of a transparent member, and reflecting surfaces are respectively formed on both

surfaces of the transparent member.

19. The projection type video display according to claim 14, 17, or 18, characterized in that

the light deflecting means comprises a single spiral light transmitter, and produces a single scrolling light per rotation driving.

20. The projection type video display according to claim 14, 17, or 18, characterized in that

the light deflecting means comprises at least two spiral light transmitters, and produces at least two scrolling lights per rotation driving.

21. The projection type video display according to claim 19, characterized in that

the light deflecting means is constructed by putting a first rotating disc having one spiral light transmitter and a second rotating disc having a spiral light transmitter for adjustment corresponding to the spiral light transmitter close together, and

there is further provided a width adjusting mechanism for changing and setting a relative rotation angle between the first rotating disc and the second rotating disc around its rotation axis, to adjust the width of the spiral light transmitter.

22. The projection type video display according to claim 21, characterized in that

the width adjustment mechanism comprises

means for forming a direct or indirect meshed state between the first rotating disc and the second rotating disc and releasing the meshed state, and

means for releasing the meshed state after stopping the rotation of the first rotating disc and the second rotating disc, to fix either one of the first rotating disc and the second rotating disc and rotate the other rotating disc.

23. The projection type video display according to claim 21, characterized in that

the width adjusting mechanism is composed of driving means for generating a relative rotation driving force between the first rotating disc and the second rotating disc while maintaining a state where the first rotating disc and the second rotating disc are together rotated.

24. The projection type video display according to claim 23, characterized in that

one of the rotating discs is provided with an actuator, and a rotation driving force is applied to the other rotating disc from the actuator.

25. The projection type video display according to claim 23, characterized in that

one of the rotating discs is provided with one constituent portion of a magnetic force actuator, and the

other rotating disc is provided with the other constituent portion of the magnetic force actuator.

26. The projection type video display according to claim 20, characterized in that

the light deflecting means is constructed by putting a first rotating disc having at least two spiral light transmitters and a second rotating disc having a spiral light transmitter for adjustment corresponding to the spiral light transmitter close together, and

there is further provided a width adjusting mechanism for changing and setting a relative rotation angle between the first rotating disc and the second rotating disc around its rotation axis, to adjust the width of the spiral light transmitter.

27. The projection type video display according to claim 26, characterized in that

the width adjustment mechanism comprises

means for forming a direct or indirect meshed state between the first rotating disc and the second rotating disc and releasing the meshed state, and

means for releasing the meshed state after stopping the rotation of the first rotating disc and the second rotating disc, to fix either one of the first rotating disc and the second rotating disc and rotate the other rotating disc.

28. The projection type video display according to claim 26, characterized in that

the width adjusting mechanism is composed of driving means for generating a relative rotation driving force between the first rotating disc and the second rotating disc while maintaining a state where the first rotating disc and the second rotating disc are together rotated.

29. The projection type video display according to claim 28, characterized in that

one of the rotating discs is provided with an actuator, and a rotation driving force is applied to the other rotating disc from the actuator.

30. The projection type video display according to claim 28, characterized in that

one of the rotating discs is provided with one constituent portion of a magnetic force actuator, and the other rotating disc is provided with the other constituent portion of the magnetic force actuator.

31. The projection type video display according to any one of claims 1 to 18, 20, or any one of claims 26 to 30, characterized in that

the light deflecting means comprises at least two light deflecting elements, and periodically produces at least two different scrolling lights, and

there is further provided video signal correcting

means for subjecting the input video signal to luminance value correction corresponding to each of at least the two different scrolling lights for each irradiation period of the scrolling light.

32. The projection type video display according to claim 31, characterized in that

there is provided means which receives the video signal to control the rotation driving of the light deflecting means in synchronization with a synchronizing signal in the video signal,

the video signal correcting means comprises a plurality of correction tables corresponding to at least the two scrolling lights,

the correction table is selected by phase information in the rotation of the light deflecting means, and

an address is generated on the basis of the synchronizing signal in the video signal, to read out correction data from the selected correction table.

33. The projection type video display according to claim 32, characterized by comprising

Image photographing means, and

means for producing a plurality of correction tables on the basis of luminance information in each area at the time of projecting a predetermined image on a screen

obtained by the image photographing means and phase information in the rotation of the light deflecting means.

34. The projection type video display according to claim 32 or 33, characterized in that

the correction table also serves as a correction table for correcting color nonuniformity.

35. The projection type video display according to any one of claims 1 to 34, characterized by comprising means for driving a light source by a pulse which is synchronized with the video signal, and

means for controlling the rotation driving of the light deflecting means in synchronization with the video signal.

36. The projection type video display according to claim 35, characterized by comprising

frequency multiplying circuit for converting the pulse into a positive number multiple of the synchronizing signal.

37. The projection type video display according to any one of claims 1 to 36, characterized in that

the lights in the respective colors separated by the color separating means are introduced into the hold type elements in the respective colors in optical path lengths which are equal to one another.

38. The projection type video display according to claim 37, characterized in that

means for separating two of the lights in the three primary colors and the other light and means for recombining the separated lights in the three primary colors are arranged on an optical axis of the lights which have not been separated,

the optical path of the two lights and the optical path of the one light are symmetrical about the optical axis, and

one of the two lights is separated at a halfway portion on the optical path of the two lights and is introduced onto the optical axis.

39. The projection type video display according to claim 37, characterized by further comprising

optical means in a rectangular parallelepiped shape serving as means for recombining the image lights in the respective colors,

one surface of the optical means in a rectangular parallelepiped shape being a light exit surface, a surface oppositely facing the light exit surface being a light entrance surface at the center, and right and left surfaces thereof being light entrance surfaces on the right and left sides,

first color separating means for separating white

light into lights having the two primary color components and a light having the other primary color component,

second color separating means for separating the lights having the two primary color components into two lights having the one primary color component, and

a double-face mirror arranged on the incident side of the hold type display element arranged on the light entrance surface at the center so as to be inclined at 45 degrees to its light incident optical axis, and in that

the optical axis of the light having the one primary color component separated by the first color separating means and the optical axis of the light having the one primary color component separated by the second color separating means are set so as to cross each other, and

the double-face mirror is arranged at the position where the optical axes cross each other.

40. The projection type video display according to claim 39, characterized in that

the optical means in a rectangular parallelepiped shape, the hold type display element arranged on the light entrance surface at the center, the double-face mirror, and the first color separating means are arranged on one straight line.

41. The projection type video display according to claim 40, characterized in that

the light deflecting means is arranged with its optical axis matched with the straight line.

42. The projection type video display according to claim 40, characterized in that

the light deflecting means is provided with its optical axis crossing the straight line at right angles.

43. The projection type video display according to any one of claims 1 to 42, characterized in that

the light deflecting means is arranged on the optical path of the light in each of the colors in the color separation optical system.

44. In a rotation driving type illuminating device for circularly deflecting, in receiving light irradiated from a light source and transmitting the received light, the light,

an illuminating device characterized by comprising:

a rod prism in a folded type in which the light entrance direction and the light exit direction differ, and

a cylindrical member having light transmitters and reflectors alternately formed periodically on its surface,

the whole or a part of the rod prism is positioned inside the cylindrical member.